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Grape Tomato
Trials
2001

BY DAVID E. HILL

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SUMMARY

In 2001, five cultivars of grape tomatoes were grown at Mt. Carmel on a loamy upland soil. Total cumulative yield throughout the growing season was related to the growth habit of the individual cultivars. Average estimated cumulative yield of indeterminate cultivars Santa, Summer Sweet, and Tami-G was 47,270 lb/A compared to 27,940 lb/A for determinate cultivars, Chiquita and Sweet Olive. Cumulative yields of Santa and Summer Sweet were greatest, each producing 15.5 lb/plant. Sweet Olive had the lowest cumulative yield (6.7 lb/plant).

As the season progressed and the indeterminate plants became larger, the average length and diameter of the fruit declined 0.1 to 0.3 inches and the average weight declined 0.2 to 0.3 ounces. Little change in the size and weight of fruit was noted in determinate plants.

Harvest of most cultivars began July 23 and concluded October 9, a 12-week period. Yields of determinate cultivars Chiquita and Sweet Olive declined after 8 weeks. Yields of indeterminate cultivars Santa, Summer Sweet and Tami-G persisted 12 weeks until frost.

Cracking of fruit became more prevalent in upper clusters of fruit in late September. Cracking in the larger-fruited Summer Sweet and Chiquita ranged from 42-50%, respectively. Cracking of fruit was least in smaller-fruited Tami-G (12%) and Santa (26%).

Grape Tomato Trials 2001

BY DAVID E. HILL

Grape tomatoes (*Lycopersicon esculentum*) have become very popular as a new category in tomato culture. Their sweetness, small size, and oblong shape, resembling grapes, makes them appealing as a salad ingredient or snack food.

The saga surrounding their development and use in the produce industry is intriguing. Chu Farms in Florida coined the term “grape tomatoes” for their product (Rosselle 2000). They sought and received federal trademark registration for use of the term. Under trademark laws, the term “grape tomatoes” could not be used for any other varieties that resembled Chu’s. The trademark not only restricted the term’s use in the produce industry but also in seed catalogue descriptions for fruit of similar size and shape. Several growers began using the name “grape tomatoes” as a generic term. Procacci Bros. Sales Corp. challenged the exclusive right for use of the term, declaring it a generic name rather than a cultivar name. After a lengthy court battle, Chu Farms relinquished the exclusive rights to the term, thus opening the doors for the produce industry and seed producers to describe fruit of similar size and shape (Lister 2000). Since then, the grape tomato variety has been taking over the cherry tomato niche according to produce industry tabloids (Harvey 2001). Its small size, sweetness, thin skin, and firmness have been credited to its success.

The cultivar, “Santa”, the name that is most associated with grape tomatoes, was first released from the University of Idaho (Boe et al. 1980). Named after the town of Santa, ID, it was described as a semi-determinate variety that produced abundant oblong fruit, 3-5 centimeters (1.2-2.0 inches) in diameter. These fruit are about twice as large as the improved variety that was developed in Taiwan under the Santa name (Rosselle 2000). Procacci Bros. procured the exclusive right to the Santa variety in the United States. Grape tomatoes sold in supermarkets are usually identified as the Santa variety on product labels. Because of the exclusion clause between Procacci Bros. and the seed developer, seed of Santa is not readily available from most seedsmen. Two seedsmen, however, list Santa in their 2002 catalogues (Table 1).

Table 1. Cultivars tested in 2001.

Indeterminate	Supplier
Santa	Thompson and Morgan,
	Holmes
Summer Sweet Hybrid	Park
Tami-G (a.k.a. Agriset-8279)	Stokes
Determinate	
Chiquita (pink)	Johnny’s Selected Seeds
Sweet Olive	Johnny’s Selected Seeds

In this bulletin, I shall discuss the yield and quality of five cultivars of grape tomatoes that were listed in 2001 catalogues. I shall also discuss strategies to maximize yield and profit through cultivar selection and management techniques.

SOIL AND RAINFALL

Soil. The grape tomato trial was conducted at Lockwood Farm, Mt. Carmel on Cheshire fine sandy loam a well-drained loamy upland soil with moderate moisture holding capacity

Rainfall. At Mt. Carmel, total rainfall throughout the growing season (June through October) was 16.8 inches compared to a 30-year average of 17.1 inches (Table 2). Small deficits, up to 1.4 inches, occurred in July, September, and October. Although the rainfall in July (1.8 inches) and October (2.0 inches) was below average, it had little impact on the growth of plants and yield. One irrigation was required in late July.

METHODS AND MATERIALS

Cultivars. Most seeds were obtained from several domestic suppliers (Table 1). Santa was obtained from a seedsman in the United Kingdom who had a distribution center in the United States. An indeterminate cultivar, Mini Charm, was included in the trial, but harvest of fruit was

Table 2. Departure from normal rainfall (inches) during the 2001 growing season (May-October) at Mt. Carmel.

	Rainfall	30-year Avg.	Departure
June	5.0	2.5	+2.5
July	1.8	3.2	-1.4
August	4.7	3.9	+0.8
September	3.3	4.2	-0.9
October	2.0	3.3	-1.4
Total	16.8	17.1	-0.4

abandoned in late August because the rank growth of the plant hid the clusters of fruit within the dense foliage and made it too difficult to harvest economically. Despite its sweet flavor, the fruit, smallest among those tested (0.4 oz), had a high incidence of cracking and did not separate well from the calyx.

Culture. Seeds were sown March 10 in Promix BX-filled 36-pot packs (3601). Pots measured 2-5/8 x 2-1/4 x 2-5/16 inches and were placed in a greenhouse maintained at 70F at night and vented at 90F during the day. On April 15, all transplants were moved to a cold frame for hardening. Water-soluble 20-20-20 fertilizer was added to the pots 1 week before transplanting in the field. On June 4, seedlings of each cultivar were transplanted 2 feet apart in rows 6 feet apart. The planting consisted of six 10 X 6-foot blocks, replicated three times. Each block contained five plants of a single cultivar. The blocks were randomly placed within each replication. Each cultivar was represented by 15 plants.

Fertilizer. The soil was treated with 10-10-10 fertilizer at a rate of 1300 lb/A before transplanting. The pH of the soil was 6.4; therefore, no lime was applied.

Pruning and tying. When the plants were about 15 inches tall, all suckers were removed up to the large lateral branch that develops just below the first flower cluster. Basal shoots, often developing during the growing season, were also removed. After pruning, the branches of all plants were tied to 5-foot oak stakes. Additional tying was necessary as the plants extended their branches. Determinate plants were tied twice and indeterminate ones were tied three times by the end of July. At the third tying, strings were attached almost to the top of the stakes. Thereafter the lengthening branches cascaded toward the ground. This configuration made it more difficult to harvest fruit from inner clusters developing on ascending stems. Taller stakes would have made late harvests less difficult.

Harvest. The first fruit were harvested on July 23 and continued weekly until October 9. At harvest, the picked fruit ranged from full to half maturity. Fruit showing the first blush of red remained unpicked until the next harvest. During August 8 and September 20 harvests, 25 fruit of each cultivar were randomly selected for measurements of weight, diameter, and length. These measurements were

compared to measurements of commercial fruit of the Santa variety purchased at a local supermarket. All fruit harvested in late-September were evaluated for cracking.

YIELD OF FRUIT AND SEASONAL DISTRIBUTION

Yield and size of fruit. The total cumulative yield of fruit was highly dependent upon the growth habit of the individual cultivars (Table 3). The average cumulative yield of indeterminate cultivars Santa, Summer Sweet, and Tami-G was estimated at 47,270 lb/A compared to 27,940 lb/A for determinate cultivars Chiquita and Sweet Olive. Cumulative yields of Santa and Summer Sweet were greatest, each producing 15.5 lb/plant. The high cumulative yield of Summer Sweet was due to heavier fruit (0.55 oz/fruit) compared to Santa (0.30 oz/fruit). Santa's high cumulative yield was due to more numerous fruit (est. 810/plant) compared to Summer Sweet (est. 440/plant). Number of fruit was estimated from total cumulative yield/ plant divided by the average weight of fruit on August 8 and September 9. Sweet Olive had the lowest cumulative yield (6.7 lb/plant).

The size and weight of fruit diminished during the growing season. The determinate cultivars, Chiquita and Sweet Olive, changed least because the fruit were borne on plants whose vegetative growth ceased as the first fruit began to mature. Weight, length, and diameter of late fruit seldom decreased more than 0.1 ounce or 0.1 inch compared to early fruit (Table 3). Fruit of the indeterminate cultivars Santa, Summer Sweet, and Tami-G became progressively smaller in length and diameter, decreasing 0.1 to 0.3 inches compared to early fruit. The smaller fruit weighed 0.2 to 0.3 ounces less on September 9 compared to fruit harvested on August 8. As the plants became progressively larger during the growing season, greater numbers of fruit were being produced but their size and weight decreased.

No standards have been established for the size and weight of grape tomatoes. Commercial seed catalogues generally distinguish them from cherry tomatoes largely by size and shape. The fruit of grape tomatoes are generally small and elongated (oval) compared to cherry tomatoes which are small and round. The degree of elongation of each cultivar is shown in Table 3. In the cultivars tested, the length to diameter ratio ranged from 1:1.2-1.4 in August and 1:1.1-1.2 in September, i.e. they became slightly more rounded as the season progressed. A round cherry tomato would have a length to diameter ratio of 1:1. Fruit from the commercial Santa sample had an average ratio of 1:1.3 and weighed 0.4 ounces. Most seed catalogues describe grape tomatoes as weighing 0.33 to 0.50 ounces.

Grape tomatoes are the smallest of the elongated fruit types. The larger elongated types, which weigh between 1 to 4 ounces, include saladette (sliced fresh in salads) and plum or roma (used in sauces). Pink-skinned Chiquita and red-skinned Summer Sweet, with fruit weighing 0.6 to 0.7

Table 3. Yield and fruit characteristics of grape tomatoes grown at Mt. Carmel, 2001.

	Avg. Cum. Yield* Lb/ plant	Est. Cum. Yield** Lb/A	Avg. Wt./ Fruit Oz.	Fruit Characteristics						
				August 8			September 20			
				Avg. length Fruit In.	Avg. Dia. In.	Ratio Dia.: Length	Avg. wt./ Fruit Oz.	Avg. length Fruit In.	Avg. dia. In.	Ratio Dia.: length
Chiquita	8.7b	31,580	0.6	1.4	1.1	1:1.3	0.5	1.3	1.1	1:1.2
Santa	15.2a	51,120	0.4	1.2	1.0	1:1.2	0.2	1.0	0.8	1:1.2
Summer Sweet	15.2a	51,120	0.7	1.4	1.2	1:1.2	0.4	1.1	1.0	1:1.1
Sweet Olive	6.7b	24,320	0.4	1.2	1.0	1:1.2	0.3	1.0	0.9	1:1.1
Tami-G	10.9ab	39,570	0.4	1.3	0.9	1:1.4	0.2	1.0	0.8	1:1.2
Santa-Commercial	---	---	0.4	1.2	0.9	1:1.3	---	---	---	---

* Mean separation within columns by Tukey's HSD multiple comparison test at $p=0.05$
 Values in column followed by the same letter did not differ significantly.

** Based on a plant spacing of 2' x 6' or 3630 plants/A

ounces, are listed as "grape tomatoes" in seed catalogues although their sizes are larger than normal.

Seasonal distribution of harvest. Harvest of most cultivars began on July 23 and concluded on October 9, a 12-week period. The seasonal distribution is shown in Figure 1. Up to week 4, yields of all cultivars were relatively low with only 5-15% of the total yield harvested. A marked increase in the yield of all cultivars was noted in weeks 5 and 6. Up to week 8, cumulative yield of Chiquita and Summer Sweet outpaced all others because their larger fruit

were heavier. After week 8, the cumulative yield of Santa caught up with Summer Sweet and kept pace until the final yield on the week 12. After week 8, cumulative yields of Chiquita and Sweet Olive slowed as the last fruit were harvested. The cumulative yield of Tami-G kept pace with all cultivars up to week 3, then lagged behind in weeks 4 through 6. In week 7, it outpaced determinate cultivar Sweet Olive and in week 9 it outpaced determinate cultivar Chiquita whose harvest concluded after 11 weeks. The yields of Chiquita and Sweet Olive markedly decreased after 8 weeks. By this time nearly 90% of the fruit had been harvested.

2001 GRAPE TOMATOES

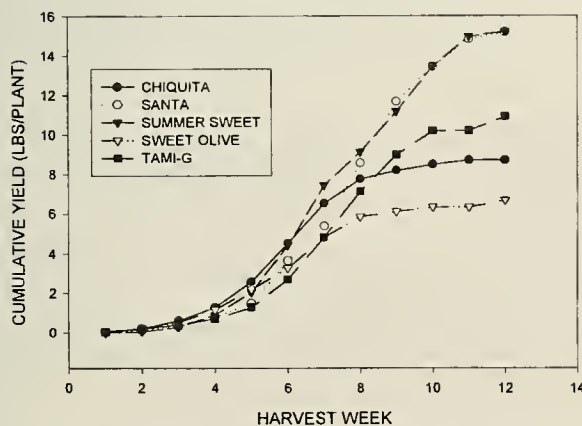


Figure 1. Cumulative distribution of yield throughout the growing season—2001.

CRACKING OF FRUIT

Cracking of tomato fruit, a physiological disorder, causes serious economic loss in the field. Cracked fruit are less attractive and the cracks provide entry of insects and decay organisms. Cracking may occur at any time during the growing season, but it is more prevalent late in the season on fruit from upper clusters (Peet and Willits 1995). Cracking occurs when the movement of water into the fruit is rapid or prolonged. Heavy rains following a period of low soil moisture causes rapid expansion of the interior pulp. If the pericarp (skin) is inelastic, it suddenly ruptures. Cracking is more prevalent late in the harvest season because the pericarp becomes thinner on the more abundant developing fruit. Cultivars that resist cracking generally have thicker pericarps, a characteristic that may render the fruit less palatable.

In the experimental plots at Mt. Carmel, cracking in the upper clusters of fruit became more noticeable in late-September. Within individual maturing clusters of fruit, only those fruit that were fully mature were prone to cracking. Among all cultivars, cracking in the larger-fruited Chiquita (50%) and Summer Sweet (42%) were most prominent. At the time of measurement, Chiquita neared the end of its productive usefulness. Cracking was least in small-fruited Tami-G (12%) and Santa (26%). Cracking in Sweet Olive was intermediate (35%).

MANAGEMENT STRATEGIES

Selection of cultivars. Because the category of grape tomatoes is new and initially suffered legal restrictions, few cultivars were available for evaluation in 2001. In 2002, six more cultivars have been released by seedsmen but are untested in Connecticut. Santa has become the standard for grape tomatoes but has limited availability because of the exclusive agreement between the developer of the cultivar and a grower-shipper. Among the other cultivars tested, Tami-G most closely resembles Santa in fruit characteristics. For sustained yields, indeterminate cultivars Santa and Summer Sweet provide the longest harvest span (12 weeks). The yields of determinate cultivars Chiquita and Sweet Olive decline after 8 weeks. To increase late yields of determinate cultivars, one might consider a second planting in early July.

Transplants. Although direct seeding of a crop is possible in Connecticut, transplants will promote earlier harvests. Transplants should be given adequate space to develop a stocky plant with a well-developed root system. Cells measuring 2 to 3 inches are preferred (Ferro, et. al. 1998). If the containers are too small, the plant may become leggy and root bound. Transplants, grown in a greenhouse, should be free of aphids and white flies.

Staking or trellising. Either practice is necessary to maintain the health of the plants and reduce rotting of fruit in contact with the soil. Tying the branches in an upright position increases air circulation and may lessen the development of early blight and Septoria leafspot. Untied plants have poor air circulation and harvest of fruit is more difficult. The first tying occurs when the plant can no longer support its weight. Determinate cultivars require a second tying and indeterminate cultivars may require a third and fourth tying to prevent the branches from touching the ground. Six-foot stakes are preferred for indeterminate cultivars while 4-foot stakes may suffice for determinate cultivars.

Pruning (suckering). Pruning lower side shoots reduces the mass of vegetation developing during the growing season and enables easier harvest of lower clusters of fruit. The lower shoots that develop between the main stem and leaf branches should be pruned up to the first lateral branch

that develops immediately below the first flower cluster. As the season progresses, additional pruning of basal shoots at the soil line may be necessary.


Mulching. Although no mulches were used on the experimental plots, some growers use black plastic mulch to warm the soil, conserve moisture, reduce nitrate leaching, and control weeds. If the plants are not staked, plastic mulch protects the fruit from direct contact with the soil. If plastic mulch is used, soil moisture should be near field capacity when the mulch is laid.

Harvest. To avoid excessive cracking, fruit should be harvested before they become fully mature. For direct roadside sales or farmers markets, fruit should be harvested as they begin to ripen. Fully ripened fruit will ship poorly, but if slated for direct sales on the day of picking, fully ripened fruit should remain intact for several hours. Containers for harvest should be shallow and not allow more than three layers of fruit to accumulate. If the fruit is fully ripened, additional layers may cause cracking in the bottom layer. If the color of the fruit is in the turning stage, deeper containers may be used.

Disease control. The experimental plots were free of disease. The grape tomato plants appeared to have resistance to early blight and Septoria leafspot. Standard tomatoes grown in a plot 30 feet away, were severely infected with both diseases which virtually denuded the vegetation of all plants by late August.

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